RESULTS FROM THE DEEP SPACE 1 TECHNOLOGY VALIDATION MISSION

Marc D. Rayman, Philip Varghese, David H. Lehman, Leslie Livesay
Jet Propulsion Laboratory/California Institute of Technology
4800 Oak Grove Dr.
Pasadena, CA 91109
USA

flight validation

Launched on October 24, 1998, Deep Space 1 (DS1) is the first mission of NASA's New Millennium Program, chartered to flight validate high-risk, new technologies important for future space and Earth science programs. The advanced technology payload being tested on DS1 comprises solar electric propulsion (SEP), solar concentrator arrays, autonomous on-board navigation and other autonomous systems, several telecommunications and microelectronics devices, and two low-mass integrated science instrument packages. During the 11-month primary mission, the technologies are being rigorously exercised so that subsequent flight projects will not have to incur the cost and risk of being the first users of these new capabilities. The performances of the technologies, including their interactions with other subsystems on the spacecraft, will be described as will the overall progress of the mission and plans for future operations. Although DS1 is driven by the requirements of the technology validation, it also presents an important opportunity to conduct solar system science. DS1's mission profile includes an encounter with asteroid 1992 KD. Plans for the encounter, and concepts for reaching extended mission targets, further illustrating the powerful capability of the SEP, will be presented. The two science instruments that are being validated, an integrated infrared/visible/ultraviolet package and a plasma physics package, are used to collect science data during the cruise and encounter. In addition, a suite of fields and particles sensors included to aid in the quantification of the effects of the SEP on the spacecraft and near-space environment will be used for science measurements complementary to those of the plasma instrument. The encounter will be a test for some of the technologies, and the return of science data will ensure that this rare opportunity to visit such an interesting solar system target will be fully exploited.